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Evaluation of Energy Conservation Measures

In Montana Public Schools

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January, 1989

SUMMARY

This paper presents an analysis of Energy Conservation Measures (ECMs) performed between 1981 and 1985 on 24 gas-heated Montana schools. This analysis was performed to evaluate how effective ECMs are in reducing space heating energy consumption, and to compare the estimated cost and savings used to qualify schools for ECM funding with the actual costs and savings that result from implementing the ECMs.

The ECMs considered in this analysis were partially funded through the Institutional Conservation Program (ICP). The ICP is a federally funded program that provides fifty percent matching grants for conservation activities in schools and hospitals. In Montana, the ICP is administered by the Department of Natural Resources and Conservation (DNRC).

The results of DNRC's analysis show that ECMs are effective in reducing space heating gas consumption at most schools, and are cost-effective. For the 24 schools considered in this analysis, the mean annual reduction in natural gas consumption is 28 percent, or 1,200 mcf per year for each school. The mean cost of the ECMs is $36,700, or $0.82 per square foot of floor area. Assuming a 20 year life for the ECMs, a 4.6 percent real discount rate, and a natural gas cost of $4.50/mcf, the mean net present value of the ECMs is $34,600 per school. The combined net economic benefit realized by the group of schools is $829,700. This means that the savings from reduced heating costs more than pays for the ECM's.

This analysis also shows that ECM costs were slightly underestimated in ICP grant applications. However, the difference between estimated costs and the actual costs paid to contractors for performing the ECMs are not statistically significant. The mean estimated cost of the ECMs is $31,000, which is $6,000 dollars less than the actual cost. Additionally, the natural gas savings were overestimated in grant applications by an average of 300 mcf per year, but the difference is not significant. The mean estimated decrease in natural gas use is 1,600 mcf per year while DNRC's analysis shows the savings are 1,200 mcf per year.

INTRODUCTION

The Institutional Conservation Program

The ICP is a federally funded program that provides 50 percent matching grants for energy conservation activities. In Montana, the ICP is administered by DNRC.

The ICP provides funding for detailed engineering and architectural analyses (Technical Assistance Report, or TA) which identify potential energy-saving modifications for public and non-profit private schools, hospitals, local government buildings, and public care institutions. The ICP also provides matching grants to eligible schools and hospitals for implementing the ECMs identified in TA reports.

Energy Conservation Measures

The ECMs considered in this analysis were performed between 1981 and 1985. All of the ECMs were implemented to reduce space and water heating natural gas consumption, with the majority targeting space heating reductions. ECMs range from inexpensive measures such as putting time clocks on water heaters at a cost of $300, to measures with a high first cost, such as window replacements at $113,000. Most schools had more than one ECM implemented, and a list of the ECMs for each school can be found on table A in the appendix.

ECMs can be divided into two major categories. Some ECMs, such as boiler controls, are only effective if maintenance personnel are properly trained and operate the systems at maximum efficiency. Other ECMs, such as increasing the levels of insulation in ceilings, are passive and do not require operator intervention. It is not feasible to separate the effects resulting from passive ECMs from the effects of operation and maintenance ECMs in this analysis, so the measures performed at each school will be analyzed as a package.

DNRC started with a sample of about 60 gas-heated schools that were potential candidates for analysis. After excluding schools with less than two years of pre-ECM consumption data and schools that had undergone major changes in the floor area served by the heating system, a total of 24 schools remained.

Evaluation Objectives

This evaluation was performed to assess the actual costs and energy savings that result from ECMs implemented in Montana schools, and to determine if there is a significant difference between these costs and savings and the estimated costs and savings identified in technical assistance reports.

Also, a defensible analysis of monitored energy use differences provides information for determining the cost effectiveness of energy conservation programs.

Data Sources

Energy Consumption Data. Monthly energy use data were obtained from billing records submitted by school administrators and from Montana Power Company. Billing records contain the date the meters were read, and the amount of natural gas (mcf) and electricity (kWh) used since the previous meter reading.

Cost Data. Estimated ECM costs were submitted to DNRC as a part of ICP grant applications. The estimated costs were developed by architectural and engineering firms that performed detailed energy audits, or TA on the schools. For most schools, more than one ECM was recommended in the TA, and individual ECM costs were documented. The actual costs of each ECM performed at the schools were submitted to DNRC after the work was performed.

Degree Day Data. Degree days are a measure of the relative warmth of a given day. Degree days are calculated by subtracting the average outside temperature (the sum of the highest temperature plus the lowest temperature, divided by 2) from the average inside temperature for a given day. For this analysis, 65 F was used for average inside temperature.

DNRC developed a computer program to calculate the sum of base 65 degree days for each billing period for each school from daily maximum and minimum temperatures for 10 sites in Montana. Temperature data were obtained from National Oceanic and Atmospheric Administration (NOAA) publications. Data for the site nearest each school were used to generate degree days per billing period.

DATA ANALYSIS

Cost of Energy Conservation Measures

The total actual cost of the package of ECMs performed at each school ranged from a low of $4,900 to a high of $160,100. The mean total actual cost of the ECMs for the 25 schools was $37,100. Total actual costs include design costs, and the labor and materials used to implement the ECMs. When the actual costs of the ECMs are normalized by the floor area of the schools, the minimum is $0.11/ft^2, the maximum is $2.83/ft^2, and the mean is $0.82/ft^2.

Table 1 lists the descriptive statistics for the total actual costs of the ECMs, and the area normalized actual ECM costs.

Table 1. Total and Area Normalized Actual ECM Costs

	Total Actual Cost ($)	Cost per Square Foot of Floor Area ($/ft^2)
Mean	37,100	0.83
Minimum	4,900	0.11
Maximum	160,100	2.83
Std. Dev.	35,300	0.62

Comparison of Estimated and Actual ECM Costs

The estimated cost of ECMs proposed for each school were submitted to DNRC as a part of the initial application for ECM grant funding. The mean estimated cost for the ECMs was $31,300, or $0.70/ft^2. The maximum estimated cost was $117,900, or $1.93/ft^2, and the minimum estimated ECM cost was $5,300, or $0.12/ft^2.

In general, the estimated costs of the ECMs were similar to the actual ECM costs. There is no statistically significant difference between estimated and actual costs at the 95 percent confidence level.

Figure 1 is a scatter plot of the estimated and actual ECM costs per square foot of floor area. The solid line running through the graph represents the points where actual and estimated costs are equal. The plot indicates that the total actual ECM costs were similar to the estimated ECM costs for most schools.

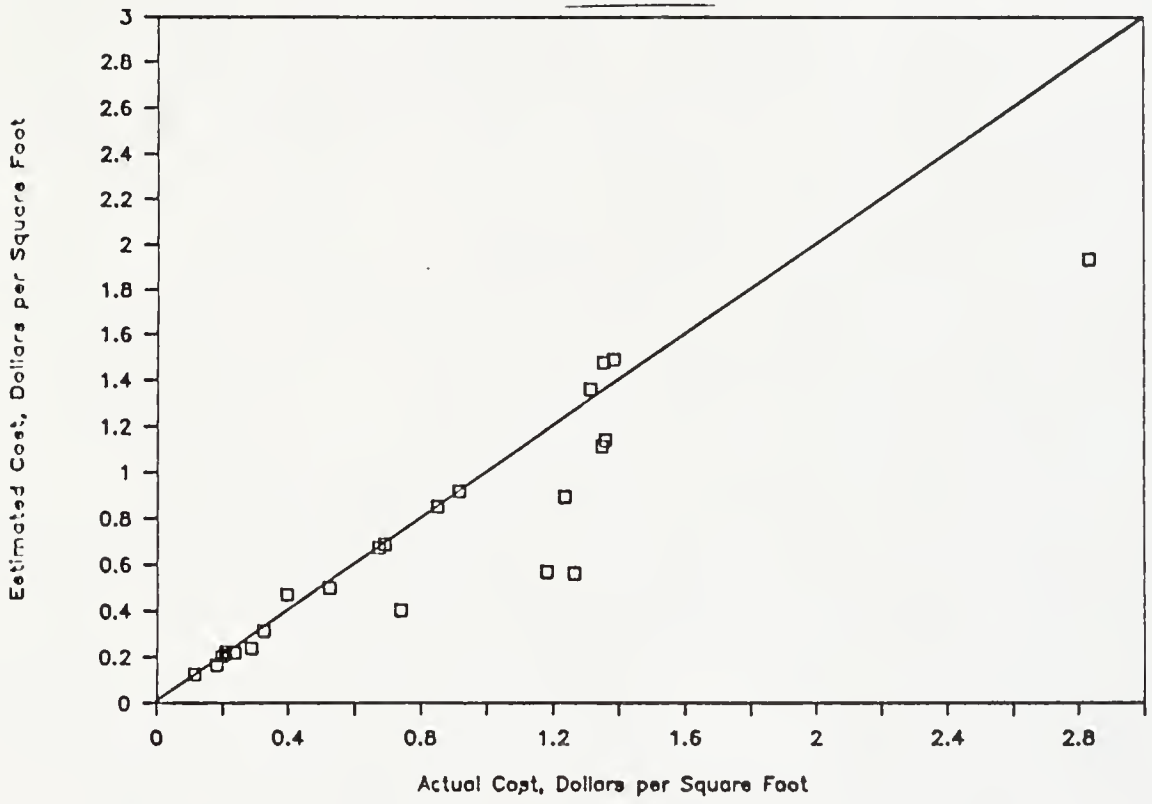

Figure 1, Estimated and Actual ECM Costs

Analysis of Annual Natural Gas Consumption

Many variables influence the amount of space heating energy used in a school. These include the rate of heat loss through the building shell, the rate of internal heat gains from occupants and powered equipment, the amount and orientation of glass, the outside temperature, the inside temperature, and the efficiency of the heating system.

One variable that exerts a major and predictable influence over space heating use is outside air temperature. Since there are large variations in average monthly outside air temperature, some method of normalizing gas consumption to account for temperatures differences is required so that a fair comparison can be made between gas consumption during different periods.

A least-squares linear regression technique was used to determine the heating response of the schools to the accumulated base 65 degree days per billing period. Separate regressions were performed on pre- and post-ECM monthly gas consumption and degree day data. The year in which ECMs were performed was excluded from analysis to remove any uncertainty about which months should be included in pre- and post-ECM periods.

Regression coefficients indicate how much gas will be used per month for base loads such as water heating, and provide a measure of how much additional gas will be required for space heating in response to accumulated degree days. Regression analysis is a useful tool for evaluating energy use differences, but this technique should not be viewed as a method that can exactly capture all variables that influence space heating consumption. Nonetheless, using regression coefficients to normalize consumption data provides a more accurate comparison than would a simple comparison of annual total gas use for pre- and post-ECM periods.

Figure 2 shows an example of the linear function generated by least-squares regression analysis of post-ECM consumption data for one of the schools. The offset of the line indicates the point at which the heating system of the building will begin to call for heat, and the slope of the line indicates the rate at which the heating system will consume gas at various degree days per period. To determine how much gas a school will require in a given month, the slope is multiplied by the number of degree days in the month and added to the offset.

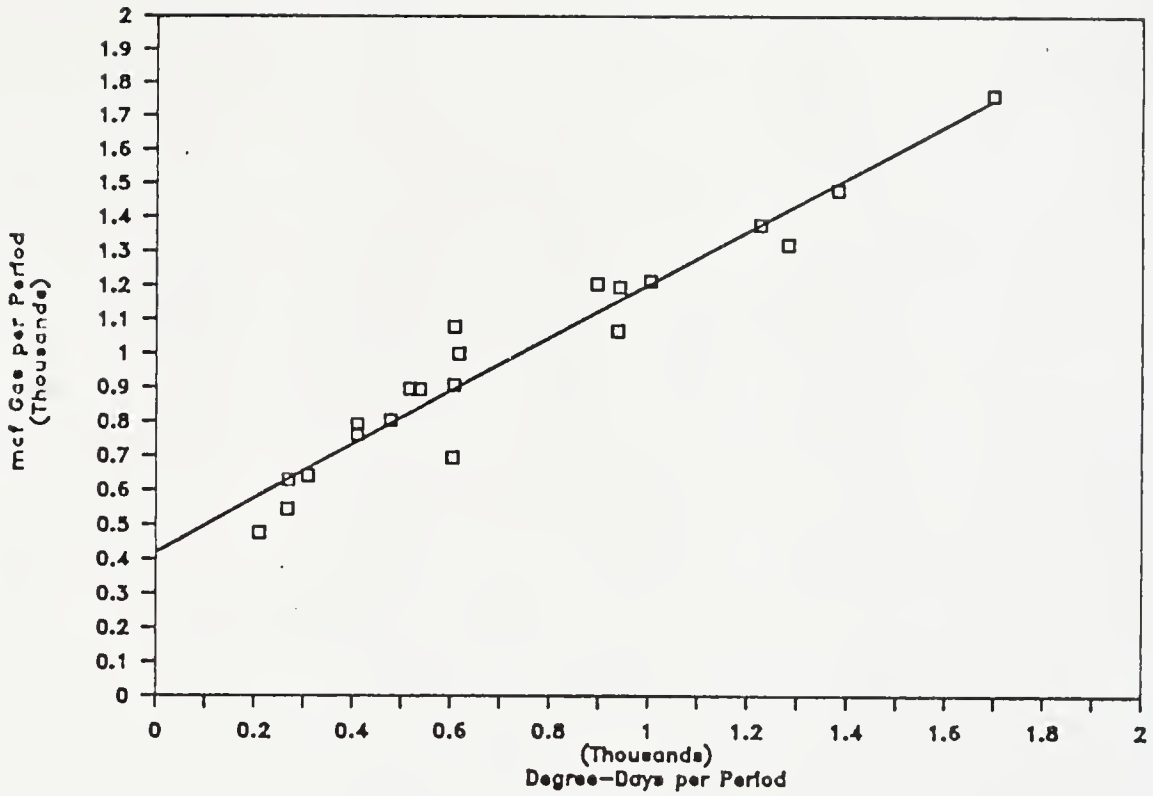

Figure 2, Least-Squares Regression of Post-ECM Gas Consumption on Degree Days For One of the Schools

Changes in Annual Gas Use Resulting From ECMs

To determine the changes in natural gas consumption resulting from the ECMs, regression coefficients from analysis of pre- and post-ECM data sets for each school were applied to 30-year average monthly degree day data for Helena, Montana. Helena data was used because it is reasonably representative of the average weather around the state.

For each school, gas consumption was calculated for the months of the typical year and than summed to obtain the typical annual consumption. The annual consumption from pre-ECM regression coefficients was compared to the annual consumption from post-ECM coefficients to determined the annual difference.

All but one school showed a decrease in natural gas consumption after ECMs were performed. The mean gas consumption for the schools as a group prior to the ECMs was 5,540 mcf per year. The mean consumption after the ECMs was 4,310 mcf per year, which is a decrease of 1,230 mcf, or 28 percent.

One school showed an increase in natural gas use after the ECMs were implemented. The ECMs at this school were performed on the gymnasium. After the ECMs were implemented, a new after-school PE program was started for girls' fall and winter indoor sports. The additional hours of use for the gymnasium resulted in greater energy use for the building.

The mean floor area of the schools is 47,900 ft^2. When the savings are normalized by the area of the schools, an average of 24 cubic feet of natural gas per square foot of floor area per year was saved as a result of the ECMs. Results for individual schools can be found in Appendix B.

Table 2 lists the descriptive statistics for the aggregate sample of schools. The statistics show that there is a large variation in the size of the schools and a large variation in the amount of gas saved at each school as a result of the ECMs.

Table 2

Floor Area and Annual Natural Gas Use

	Floor Area (ft^2)	Pre-ECM Use (mcf)	Post-ECM Use (mcf)
Mean	47,900	5,540	4,310
Minimum	15,600	2,010	1,500
Maximum	129,700	17,360	12,280
Std. Dev.	28,600	4,370	3,200

ECMs are clearly effective in reducing space heating requirements for most schools. The data shows that most schools realize an immediate reduction in gas consumption following the implementation of ECMs. The data also shows that reduced space

heating consumption remains consistent over time. This means that the schools continue to have smaller heating bills, and the effectiveness of the ECMs does not appear to degrade over time.

Figure 3 is a distribution histogram of natural gas savings. The histogram indicates that most of the schools used between 10 and 30 percent less gas after the ECMs were implemented.

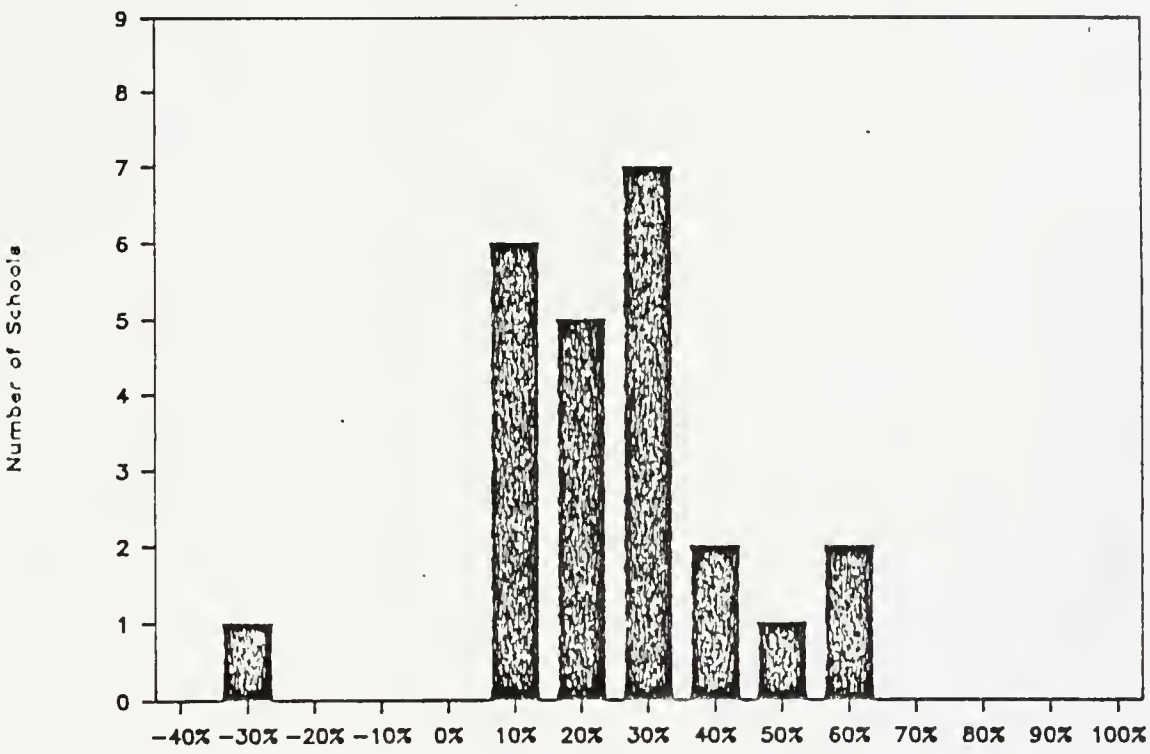

Figure 3, Distribution of Percent Savings for Natural Gas Positive Percentages Indicate Decrease in Gas Consumption

Estimated Natural Gas Savings From Grant Applications Compared to Actual Savings

In general, the natural gas savings estimates in the ICP grant applications are slightly greater than the actual energy savings, but the differences between mean estimated and mean actual savings are not statistically significant. The mean estimated natural gas savings was 1,600 mcf per year for the 24 schools. The mean actual savings as determined from regression analysis is 1,240 mcf per year. Table 3 lists the descriptive

statistics for both estimated and actual natural gas savings. The school that had an increase in post-ECM gas use appears in the table as a parenthetical minimum, indicating an increase in gas use of 1,830 mcf.

Table 3

Estimated and Actual Natural Gas Savings

	Estimated Savings (mcf/year)	Realized Savings (mcf/year)
Mean	1,600	1,240
Minimum	210	(1,830)
Maximum	7,230	5,080
Std. Dev.	1,580	1,470

Figure 4 shows a scatter plot of estimated and actual natural gas savings for the 25 schools. The plot indicates there is reasonably good correlation between the estimates and the actual savings, and that estimated savings are generally higher than actual savings. The line running through the graph represents the points where estimated and actual savings are equal.

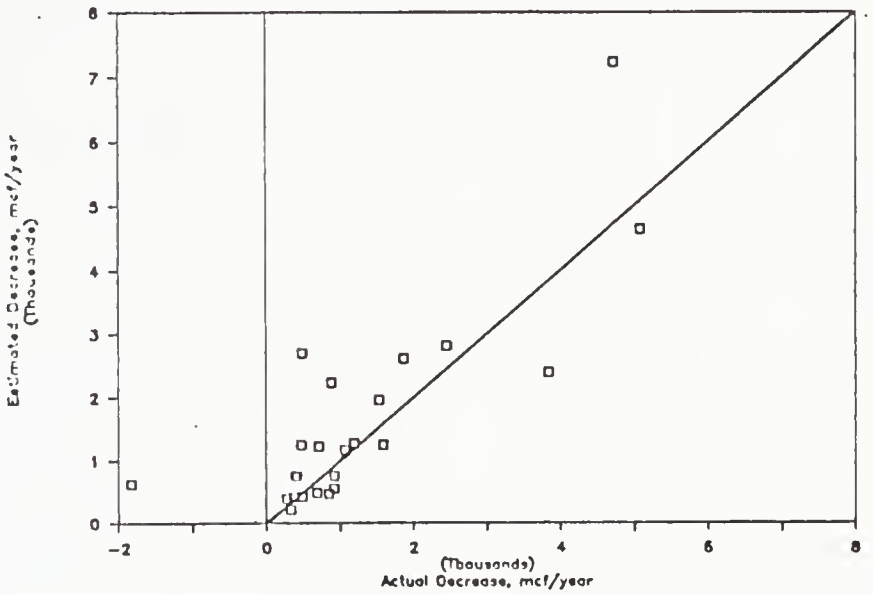

Figure 4, Estimated and Actual Natural Gas Savings

ECONOMICS OF THE ECMs

Simple Payback. To calculate the payback for the package of ECMs implemented at each school, the total cost of the ECMs was divided by the annual savings resulting from the ECMs multiplied by the price of natural gas. This requires an assumption about the price of natural gas. For our purposes, $4.50/mcf is a realistic price, considering current and historic natural gas costs.

Based on the total ECM costs and the savings obtained from regression analysis, the mean simple payback for the 24 schools is 8.5 years. The minimum, or shortest payback is 0.6 years, and the longest payback, excluding the school that showed an increase in gas consumption, is 28.0 years.

Estimated simple payback from TA reports ranged from a minimum payback of 0.8 years to a longest payback of 14.3 years. The mean payback from TA reports is 5 years.

Net Present Value of the ECMs. A better approach to assessing the economics of the ECMs is to use a net present value (NPV) calculation. NPV comparisons are commonly used to evaluate investment options, and are appropriate for analyzing the economic benefits that result from investments in conservation. NPV takes into account the cost of the ECMs and the real value of the future savings that will result from the ECMs. For instance, if a school does not have any ECMs performed there is no initial cost for conservation and no savings are realized over time. If ECMs are implemented, an initial cost is incurred for conservation, and heating costs would be reduced in the future. The NPV of the ECMs can be viewed as the difference between the life-cycle costs that result from heating the building without ECMs and the life-cycle costs of the ECMs and the saving that result from the ECMs. When the NPV of conservation is positive, an economic benefit from conservation is realized.

The NPV calculations used for this evaluation convert future annual energy savings over a fixed lifetime of 20 years for the ECM into real dollars using a 4.3 percent discount rate. This takes into account interest rates and inflation. Although the ECMs were performed over a several-year period, from 1980 to 1985, initial ECM costs were not adjusted to reflect differences in the real value of the dollar. The price of natural gas was assumed to be $4.50 per mcf. The cost of natural gas is expected to remain constant in real terms over the 20 year analysis period.

The mean NPV of the ECMs performed at the schools is $34,600. The largest positive NPV is $243,700, and the largest negative NPV is -$32,200.

Seven of the 24 schools had a negative net present value. This means that these schools did not realize large enough natural gas savings to pay for the ECMs. The remaining 17 schools realized a financial benefit from the conservation measures. The aggregate data for the 24 schools as a group shows that the savings outweighed the costs for the ECMs and the group realized a combined economic benefit of $829,700.

When the estimated costs and gas savings from TA reports are used to calculate an estimated NPV, eight of the schools show a negative estimated NPV. All seven of the schools that have a negative NPV from actual costs and savings show a negative NPV from estimated costs and savings. This finding demonstrates that NPV calculations would be better than simple payback as an economic criteria for selecting conservation measures for funding.

CONCLUSIONS AND RECOMMENDATIONS

The majority of the schools, 23 out of 24, used less natural gas after the ECMs than was used prior to the ECMs. However, seven of the schools did not realize a large enough reduction in gas use to justify the investment in conservation. As a group, the 24 schools realized an economic benefit from the ECMs.

The mean total cost of the ECMs was $37,100 and the mean annual decrease in natural gas use is 1,240 mcf. Using a 20-year lifetime, 4.6 percent real discount rate, and $4.50/mcf, the mean net present value of the ECMs is $34,570 per school.

Estimated ECM costs and natural gas savings are generally similar to the actual costs and saving. The differences between estimated and actual costs and savings are not statistically significant.

Since ECMs have been found to be generally cost-effective, schools that are candidates for future ECMs would probably benefit from similar conservation efforts. However, a better method of determining which ECMs are appropriate candidates for funding should be developed. DNRC has shown that NPV calculations provide a more accurate economic evaluation of conservation investments.

The benefits accruing to the schools that implemented ECMs result in lower heating costs. This directly reduces the operating expenses of the schools and provides a benefit to all taxpayers. Additionally, the measures installed in Montana schools clearly result in savings that exceed the initial cost of installing the ECMs. Therefore, DNRC recommends that DOE continue to fund the ICP program.

Appendix A: List of ECMs Performed at Each School

IDNMBR Identification Number of the School

DESCRIPT Brief Description of Individual ECM

EST$ The Estimated Cost of the ECM From TA Report

ELECTSAV Estimated Electrical Savings of the ECM

GASSAV Estimated Gas Savings of the ECM (mcf/year)

ESTSAV$ Estimated Annual Dollar Savings from TA Report

ACTCOST The Actual Cost of the ECM

IDNMBR	DESCRIPT	EST$	ELECSAV	GASSAV	ESTSAV$	ACTCOST
5	INST NIGHT TEMP CONTROL	13968	0	1549	7096	11401
5	REDUCE INFILTRATION	1558	0	593	2911	12137
5	REMOVE WINDOWS EAST WING	10000	0	161	790	9666
5	DESTRAT FANS IN GYM	900	0	59	291	920
5	REMOVE GYM WINDOWS	8000	0	245	2001	7733
19	SOUTHEAST WINDOWS	1251	0	57	301	2200
19	REFLECTORS	708	0	36	188	0
19	GYM GLASS BLOCK	545	0	23	123	997
19	INSULATE HALL CEILING	1683	0	65	332	3079
19	NORTHEAST WINDOWS	651	0	54	285	1191
19	SKYLIGHTS	358	0	17	89	655
19	SOUTHEAST GLASS BLOCK	1794	0	79	415	3282
19	NORTHEAST GLASS BLOCK	1794	0	58	261	3282
19	GYM WINDOWS	700	0	11	61	1291
19	NORTHWEST WINDOWS	1050	0	87	469	1935
27	INSULATE STEAM PIPE	3455	0	385	1287	2265
27	INST PNEUMATIC CONTROL	6365	0	418	1859	6365
27	WEATHERSTRIP DOORS	1816	0	34	189	445
27	INSULATE ATTIC - R38	11367	0	914	3197	11387
30	REVISE TEMP CONTROLS	23500	0	540	3582	22775
30	INSTALL 2ND CLOCK THERMOSTAT	1293	0	204	1267	1335
30	INSTALL LOW TEMP. H PIPE	2400	0	320	1990	2335
30	ADD FLUE DAMPER	9400	0	500	2000	0
30	LOW HEAT	991	-2	107	623	1300
30	ADD TIME CLOCK DHW PUMP	300	0	0	57	0
30	BOILER RESET CONTROL	720	0	0	130	505
30	CENTRAL CONTROL SYSTEM	6500	0	0	1166	7000
120	ADD TIME CLOCK-DHW PUMP	300	9	7375	196	0
120	INSTALL MOTORIZED AIR FANS	2630	310	0	1604	0
120	CENTRAL CONTROL SYSTEM	25000	256	20320	7210	29000
113	FLOOR OVER UNHEATED WALL	9320	0	0	1511	32005
113	REPLACE DR WINDOWS	23004	0	0	5304	18211
113	INSULATE WINDOWS	6192	0	0		0
113	ADD INSULATORS	1400	0	0	529	1183
118	CENTRAL CONTROL SYSTEM	6500	12	411	1169	6550
118	BOILER TEMP CONTROL	720	0	50	134	505
118	ADD TIME CONTROL-DHW	300	2	16	57	0
107	INSTALL NIGHT CONTROL	1615	0	50	242	2200
107	WINDOW REPLACEMENT	95000	0	3773	15074	113570
107	REPLACE OVERHEAD DOOR	1700	0	87	343	958
107	TIME CLOCK FOR DHW PUMP	300	21	29	235	339
107	INSULATE ATTIC WALLS	12197	0	203	1173	39440
107	REPLACE BOILER CONTROLS	9763	0	287	861	3000
103	REPLACE DR N,E,W WINDOWS	85000	0	0	6387	71127
103	ADD INSULATION	1500	0	0	341	1283
103	ADD SOLAR COLLECTORS	24500	0	0	2520	32689
103	INSULATE WINDOWS	12632	0	0		0
103	INSUL STEAM HEAD PIPE	2408	0	0	1937	4507
102	ADD INSULATION	795	0	14	489	1703
102	INSTALL MINIMAL OUTLETS	34472	0	464	3567	28184
102	INSTALL MINIMAL OUTLETS	24433	0	473	3464	20160
121	INSULATE CONDENSATE PIPE	1250	0	50	417	2500
1	INSULATE HOT PIPES	767	0	42	307	895

Appendix B:	Consumption Data for Each School
ID. NO.	Identification Number of the School
Area, ft2	The Area of the Building
N	Number of Data Periods for Each Meter
AVE/MONTH	Average Monthly Electrical Consumption
Rsq	Correlation Coefficient for Regression of Natural Gas Consumption on Degree Days
CONST.	Correlation Constant From Regression
SLOPE	Slope of Regression Equation
@ tmy Helena	Annual Gas Consumption From Regression Analysis For a Typical Year
MCF/FT2/DD	Area Normalized Gas Consumption From Regression Analysis
ECM YEAR	The Year in Which ECMs were Performed
DELTA %	Actual Percent Change in Gas Consumption due to ECMs
DELTA G	Actual Change in Gas Consumption (mcf/year)
DELTA E	Change in Average kWh/month After ECMs
EST $	Estimated Cost of Package of ECMs
ESTGSAV	Estimated Gas Savings From Package of ECMs From TA Report
ACT COST	Actual Cost of Package of ECMs
@4.5/mcf	Actual Annual Dollar Savings at $4.50/mcf
SIM PB	Actual Simple Payback of ECM's at $4.50/mcf
EST SIM PB	Estimated Simple Payback From TA Report
NPV	Net Present Value of the ECMs

PRE ECM CONSUMPTION

Electricity, kWh

ID. NO.	Area, ft2	N	AVE/MONTH
5	33492	35	9731
17	24360	9	30230
38	55700	22	14447
59	33892	55	11112
104	104340	53	147485
113	61327	55	11401
118	34332	45	11890
297	129656	38	65362
303	79233	56	16916
342	74930	55	13767
370	23979	55	6532
372	41383	28	5740
429	32450	57	12304
433	37968	55	14243
500	91974	26	50641
502	43050	20	14049
524	34220	53	8191
540	21140	37	7160
553	61160	53	47257
620	19000	16	4401
684	31484	55	9463
690	15597	28	5633
706	35636	54	14487
726	28471	28	8742
MEAN	47909	41	22693
MIN	15597	9	4401
MAX	129656	57	147485
STD DEV	28609	15	30614

Gas, mcf

ID. NO.	N	Avg	CONST.	SLOPE	# toy Helena	MCF/FT2/DD
5	35	0.72	-27.97	0.00	6074	0.181
17	9	0.90	57.86	0.27	2814	0.116
38	22	0.75	-121.10	0.65	5523	0.099
59	54	0.79	-43.45	0.39	2627	0.079
104	45	0.55	345.24	1.61	16757	0.163
113	55	0.90	-55.04	0.79	5712	0.093
118	45	0.75	26.24	0.36	3210	0.094
297	37	0.62	496.06	1.43	17351	0.134
303	56	0.89	13.86	0.78	6373	0.081
342	55	0.90	-70.68	0.75	5401	0.069
370	55	0.89	-1.92	0.26	2462	0.026
372	28	0.59	67.14	0.42	4107	0.075
429	59	0.85	-26.29	0.29	2485	0.062
433	55	0.90	63.19	0.66	5973	0.157
500	26	0.71	426.60	0.90	12300	0.134
502	20	0.89	-9.31	0.48	3666	0.085
524	53	0.77	14.19	0.35	2981	0.087
540	37	0.84	-9.77	0.27	2043	0.097
553	42	0.75	366.20	0.87	11274	0.184
620	16	0.93	67.19	0.20	2418	0.127
684	55	0.89	27.92	0.30	2753	0.088
690	28	0.69	21.30	0.22	2025	0.130
706	54	0.96	2.40	0.30	3867	0.086
726	28	0.37	114.17	0.38	4424	0.155
MEAN	40	0.79	72.67	0.58	5540	0.112
MIN	9	0.55	-121.10	0.20	2485	0.062
MAX	59	0.96	496.06	1.61	17351	0.184
STD DEV	15	0.12	159.77	0.37	4365	0.035

POST ECM CONSUMPTION

Electricity, kWh | Gas, mcf

ID. NO.	Area, ft2	N	DATE/MONTH	ECM YEAR	ID. NO.	N	Psq	CONST.	SLOPE	ECM HEATING	NCF/FT2/D	DELTA %	DELTA $	DELTA E	EST $	ESTESAV	NCF COST	$/mcf	e/e pb	es e/e pb	PV	NPV	COST/FT2	DELS/FT2	est/ft2
5	33492	16	8235	83	5	19	0.92	-42.16	0.56	4283	0.125	-0.45	1671	-0.18	45436	2647	42965	8419	5.2	3.9	186573	64686	1.31	55.9	1.36
19	24560	9	12383	85	19	8	0.96	26.81	0.27	2448	0.182	-0.15	366	-1.44	5640	495	15648	1647	10.9	5.4	21225	3235	0.74	15.0	0.48
38	55784	29	17658	82	38	29	0.76	7.13	0.55	4453	0.852	-0.24	1858	0.16	36413	1166	36438	4772	8.1	7.3	61537	22187	0.69	19.8	0.63
59	33892	25	18614	83	59	25	0.97	-27.24	0.33	2299	0.869	-0.14	328	-0.83	7258	269	7765	1474	5.3	7.7	19814	11229	0.24	9.9	0.22
184	184349	26	124142	83	184	26	0.86	-6.65	1.55	12243	0.117	-0.39	4716	-0.19	25442	7232	25852	21211	1.4	0.8	273541	243691	0.29	45.2	0.24
113	61327	31	10787	84	113	31	0.84	12.58	0.51	4179	0.863	-0.37	1533	-0.86	24528	1954	72359	6839	10.5	4.8	82374	16615	1.18	25.8	0.57
118	34132	24	11581	83	118	26	0.94	-16.14	0.32	2369	0.869	-0.36	841	-0.83	7258	461	7135	3786	1.9	3.5	46625	41638	0.21	24.5	0.21
297	129656	21	75928	84	297	21	0.74	-18.79	1.57	12275	0.095	-0.41	5076	0.14	115781	4637	152115	22544	7.0	5.5	254595	134468	1.23	39.2	0.83
383	79833	31	16548	84	383	31	0.82	-2.17	0.56	3304	0.858	-0.63	2454	-0.82	117668	2643	109666	11844	9.9	9.3	142422	32736	1.38	31.8	1.49
342	74528	31	7666	84	342	31	0.84	-1.21	0.54	4287	0.857	-0.21	915	-0.78	35257	548	29567	4117	7.2	14.3	53466	23418	0.48	12.2	0.47
378	23579	31	7619	84	378	31	0.86	17.47	0.18	1651	0.869	-0.25	411	0.14	35367	743	32451	1849	17.5	10.6	23646	-8685	1.25	17.1	1.47
372	43329	22	10827	84	372	22	0.94	-20.57	0.49	3623	0.884	-0.13	466	0.43	36348	2691	36340	2136	16.9	3.0	28192	-8786	0.85	11.2	0.35
429	35458	27	13346	83	429	27	0.94	-16.63	0.24	1738	0.853	-0.16	275	0.07	6588	384	6258	1235	5.1	3.8	15932	9562	0.28	8.5	0.28
433	37968	31	18921	83	433	31	0.79	15.29	0.53	4384	0.115	-0.36	1569	0.25	21378	1251	47976	7152	6.7	3.8	98226	44252	1.26	41.9	0.56
588	91574	22	64789	84	588	22	0.93	389.85	0.81	11128	0.121	-0.11	1158	0.09	26765	1272	29783	5346	5.6	5.8	68546	39163	0.32	12.9	0.31
582	42869	29	13757	82	582	29	0.76	-95.13	0.92	5454	0.128	0.33	-1628	-0.82	5348	624	6388	-8224	-0.6	1.9	-186257	-118257	0.11	-42.5	0.12
524	34218	25	9688	83	524	25	0.91	-26.97	0.33	2581	0.867	-0.38	668	0.15	7685	475	7281	3858	2.4	3.6	39439	32238	0.21	19.9	0.22
548	21188	20	5529	84	548	19	0.69	-25.36	0.24	1568	0.874	-0.38	475	-0.38	42736	1243	53767	2137	28.8	7.3	27558	-32229	2.83	22.5	1.93
553	61168	26	43777	81	553	26	0.94	-38.54	0.99	7425	0.122	-0.52	3829	-0.36	18188	2354	11188	17276	8.6	8.9	222789	211629	0.18	62.8	0.17
628	13668	26	5883	82	628	26	0.84	2.92	0.18	1598	0.879	-0.61	918	0.28	9524	744	9346	4131	2.4	2.8	53875	43329	0.52	48.3	0.58
684	31484	31	8726	84	684	31	0.84	32.18	0.25	2383	0.875	-0.16	384	-0.88	25642	735	42657	1729	24.7	10.8	22298	-28253	1.36	12.2	1.14
698	15537	22	8828	84	698	22	0.78	23.43	0.16	1546	0.839	-0.31	479	0.38	18438	419	18438	2156	4.9	5.6	27665	17315	0.67	38.7	0.67
786	35625	31	18566	84	786	31	0.82	28.83	0.25	2357	0.868	-0.38	765	0.83	39683	1221	46442	3191	15.8	7.2	41158	-6258	1.35	19.9	1.11
726	25471	22	9749	84	726	17	0.83	57.85	0.36	3544	0.124	-0.25	882	0.18	25458	2234	25488	3962	6.6	2.6	51889	25981	0.92	38.9	0.92
MEAN	47593	25	21861	83		25	0.84	11.36	0.52	4385	0.868	-0.26	1235	-0.85	31313	1602	37189	5558	8.5	5	71679	34578	0.83	23.88	0.78
MIN	15597	9	5883	81	5	8	0.69	-95.13	0.16	1563	0.852	-0.63	-1628	-1.44	5348	269	4388	-8224	-0.6	0.8	-186257	-118257	0.11	-42.48	0.12
MAX	129656	31	124142	85	726	31	0.97	389.85	1.57	12275	0.128	0.33	5076	0.43	117668	7238	152115	22544	29.8	14.3	254595	243691	2.83	62.77	1.93
STD DEV	28689	5	27693	1	233	6	0.87	84.67	0.38	3154	0.845	0.19	1478	0.37	25958	1575	35257	6614	7.1	3.3	85268	71725	0.62	28.27	0.49